426/31

EVERAGES

Washing Processes

DUPLICATE

1894 31 (1)

RECORDED

N° 4981 A.D. 1893

Date of Application, 7th Mar., 1893
Complete Specification Left, 7th Dec., 1893—Accepted, 20th Jan., 1894

PROVISIONAL SPECIFICATION.

Improvements in the Treatment of Rice or other Grain for the Production therefrom of a Material suitable for Use in Brewing, or for other purposes.

I, FREDERICK EDWARD VESEY BAINES of 77 Walsingham House, Piccadilly in the County of London Gentleman do hereby declare the nature of my invention to be as follows:—

My invention has reference more especially to a process for which Letters Patent No. 18258 of 1891 have been granted to me. By the process described in my Specification of the said Letters Patent a large proportion of the starch of the rice or other grain can be converted into dextrin.

By protracting the digestion for 2 or 3 hours I have been able to obtain a product consisting of as much as 81 *per cent.* of pure dextrin with only 5·75 *per cent.* of starch. I have found that this considerable conversion of the starch of the grain into dextrin is due to the presence of a small amount of acid (chiefly lactic acid) existing naturally in grain in variable amount. On completely neutralizing the natural acid and then submitting the grain so treated to a temperature equal to from fifty to sixty pounds steam pressure in conjunction with seven or eight times its weight of water for a period of one to three hours no such considerable conversion of the starch into dextrin takes place, in fact there is very little conversion.

With the object of improving my aforesaid process I have made experiments with a view to effecting a conversion of the remainder of the starch of the grain and to thereby obtain an improved preparation of dextrin of a good light colour free from acid and from objectionable flavour and odour containing no unaltered starch and the least possible quantity of sugar. Such preparation will be of great utility for brewing as well as for other purposes. For brewing it can be used in the copper or even in the cask and will impart a desirable roundness and palate fulness to the beer and generally improve its "condition" and stability.

I am aware of the ordinary dextrin of commerce or "British gum" which is prepared from commercial starch by moistening it with dilute acid and subsequently roasting the starch so treated. This material is used for stiffening calicoes, wall papers and the like, and is sold in the form of a dry powder. It consists very largely of dextrin, but it has a most objectionable flavour and odour due to torrefaction products inseparable from the process of its manufacture.

I am also aware that in the manufacture of glucose or brewing sugar by the ordinary method from starch or raw grain, by treatment with acid in conjunction with water, preparations have been obtained consisting of mixtures of dextrin and sugar, by stopping the converting action of the acid before the whole of the dextrin has been converted into sugar, but only a limited proportion of dextrin can thus be obtained as a conversion of a portion of the dextrin into sugar takes place simultaneously with the conversion of the starch into dextrin.

Such preparations containing dextrin accompanied by considerable portions of sugar are supplied in the form of a concentrated solution, or syrup.

Owing to the amount of sugar present they cannot be obtained in the form of a dry powder or one that will remain a dry powder under ordinary atmospheric conditions.

If ordinary sugars such as can sugar, glucose or maltose, or if ordinary products consisting of glucose and dextrin or maltose and dextrin be applied to a heated surface they only melt and remain in a melted condition as long as they are upon

[*Price* 8*d.*]

the said surface until they eventually become decomposed. If they be allowed to remain upon a heated surface for a certain time and then be removed and rapidly cooled they will become hard and brittle and can be ground to a powder, but this powder will under ordinary atmospheric conditions soon deliquesce and cease to be a dry powder.

Having ascertained as aforesaid that considerable conversion of the starch of the grain into pure dextrin according to my aforesaid process was due to a small amount of lactic acid naturally present in the grain I experimented and found that by supplementing my said process by the addition of a further small amount of lactic acid complete conversion of the starch was effected, for example one part of rice digested with seven parts of water containing one half of one *per cent.* of lactic acid for one hour at a temperature equal to fifty lbs. steam pressure was completely converted, no unaltered starch being left, and the presence of sugar was barely perceptible to the taste.

The amount of added acid will however be governed by the quantity of acid which may naturally exist in the particular grain being treated.

As lactic acid is expensive to use I then experimented with smaller quantities of stronger acids such as sulphuric acid and I found for example that one part of rice digested with seven parts of water containing ·05 *per cent.* (five hundredths of one *per cent.*) of strong sulphuric acid (S. G. 1840) for one hour at a temperature equal to fifty lbs. steam pressure was converted with a result corresponding to that which I obtained by the use of one half of one *per cent.* of lactic acid.

An increase in the amount of acid employed resulted in the development of excess of sugar attended by a darkening in colour. Other acids may be used for instance a one tenth of one *per cent.* strong hydrochloric acid in place of the aforesaid quantity of sulphuric acid will effect the same result. I prefer not to use much less than the seven parts of water as more acid would then be required to completely convert the starch causing an increase in the production of sugar besides injuring the colour of the product.

In carrying out my improved process according to my present invention I prefer to subject the grain (I will presume it to be rice) to a temperature equal to about fifty lbs. steam pressure in conjunction with about seven times its weight of water containing about ·05 *per cent.* of strong sulphuric acid for a period of about half an hour terminating the process as soon as the resulting solution shews on testing a diluted sample with a solution of iodine a reddish-brown or reddish-purple colour.

I do not restrict myself to the temperature equivalent to the pressure hereinbefore stated as I can employ a higher pressure in which case the process will be expedited and less acid will be required but for convenience of manipulation I prefer to employ a temperature as hereinbefore stated.

The product obtained according to my present invention when applied to a heated surface (the solution being preferably previously concentrated) becomes completely dry and can be scraped with great facility from the heated surface and can then be reduced to powder and will remain dry, it not becoming sticky under ordinary atmospheric conditions.

Having obtained a solution from the rice by treatment as hereinbefore described the minute amount of acid in the product can be neutralized which may be done by milk of lime if sulphuric acid has been used or by soda if hydrochloric acid has been used and the whole is then filtered.

The colour of the solution is exceedingly light and therefore the solution does not need to be decolourized by animal charcoal. The filtrate may next be evaporated and the concentrated liquid applied to the surface of a steam heated cylinder from which it can be removed in a dry condition and subsequently finely ground.

If the solution be highly concentrated before applying it to the surface of the steam heated cylinder I may employ sets of rollers adjustable to the surface of the cylinder along its length in order to keep the material in a flattened condition of an

equal thickness upon the cylinder during the drying. The rollers may be kept cool by means of cold water in order to prevent the material sticking to the rollers.

Spring steel scrapers may be used to bear against the cylinder to scrape off the dried product the spring of the scrapers yielding to any inequalities which there may be upon the surface of the cylinder.

Although I have described the invention more particularly with reference to the production of a material for use in brewing I do not limit myself to the use of the product for that purpose as it may be used for other purposes for instance for stiffening fabrics or in the manufacture of wall papers. In these cases as the complete conversion of the starch is not so important I may add still less acid than the proportion above stated.

Dated this 7th day of March 1893.

J. H. JOHNSON & Co.,
47, Lincoln's Inn Fields, London, W.C., Agents.

COMPLETE SPECIFICATION.

Improvements in the Treatment of Rice or other Grain for the Production therefrom of a Material suitable for Use in Brewing, or for other purposes.

I FREDERICK EDWARD VESEY BAINES late of 77 Walsingham House Piccadilly in the County of London now of Lynwood Vanbrugh Hill Blackheath in the County of Kent Gentleman do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

My invention has reference more especially to a process for which Letters Patent No. 18258 of 1891 have been granted to me. By the process described in my Specification of the said Letters Patent a large proportion of the starch of the rice or other grain can be converted into dextrin.

By protracting the digestion for two or three hours I have been able to obtain a product consisting of as much as 81 *per cent.* of pure dextrin with only 5·75 *per cent.* of starch. I have found that this considerable conversion of the starch of the grain into dextrin is due to or largely influenced by the presence of a small amount of acid (chiefly lactic acid) existing naturally in grain in variable amount by its action upon the grain under the conditions of proportion of water and temperature set forth in the said Specification. On completely neutralizing the natural acid and then submitting the grain so treated to a temperature equal to from fifty to sixty pounds steam pressure in conjunction with seven or eight times its weight of water for a period of one to three hours no such considerable conversion of the starch into dextrin takes place in fact there in very little conversion.

With the object of improving my aforesaid process I have made experiments with a view to effecting a conversion of the remainder of the starch of the grain and to thereby obtain an improved preparation of dextrin of a good light colour free from acid and from objectionable flavour and odour containing no unaltered starch and the least possible quantity of sugar. Such preparation will be of great utility for brewing as well as for other purposes. For brewing it can be used in the copper or even in the cask and will impart a desirable roundness and palate fullness to the beer and generally improve its condition and stability.

I am aware of the ordinary dextrin of commerce or "British gum" which is prepared from commercial starch by moistening it with dilute acid and subsequently roasting at a moderate temperature the starch so treated or without using acid and by roasting the starch at a higher temperature. This material is used for stiffening calicoes wall papers and the like and is sold in the form of a dry powder. It consists

very largely of dextrin, but it has a most objectionable flavour and odour due to torrefaction products inseparable from the process of its manufacture.

I am also aware that in the manufacture of glucose or brewing sugar by the ordinary method from starch or raw grain by treatment with acid in conjunction with water, preparations have been obtained consisting of mixtures of dextrin and sugar by stopping the converting action of the acid before the whole of the dextrin has been converted into sugar, but only a limited proportion of dextrin can thus be obtained as a conversion of a portion of the dextrin into sugar takes place simultaneously with the conversion of the starch into dextrin.

Such preparations containing dextrin accompanied by considerable proportions of sugar are supplied in the form of a concentrated solution or syrup. Owing to the amount of sugar present they cannot be obtained in the form of a dry powder or one that will remain a dry powder under ordinary atmospheric conditions.

If ordinary sugars such as cane sugar, glucose or maltose, or if ordinary products consisting of glucose and dextrin or maltose and dextrin be applied to a heated surface they only melt and remain in a melted condition as long as they are upon the said surface until they eventually become decomposed. If they be allowed to remain upon a heated surface for a certain time and then be removed and rapidly cooled they will become hard and brittle and can be ground to a powder, but this powder will under ordinary atmospheric conditions soon deliquesce and cease to be a dry powder.

Having ascertained as aforesaid that considerable conversion of the starch of the grain into pure dextrin according to my aforesaid process was due to a small amount of acid (usually lactic acid) naturally present in the grain, I experimented and found that by supplementing my said process by the addition of a small amount of lactic acid complete conversion of the starch was effected, for example, one part of rice digested with seven parts of water containing one half of one *per cent.* of lactic acid for one hour at a temperature equal to fifty pounds steam pressure was completely converted no unaltered starch being left, and the presence of sugar was barely perceptible to the taste. The amount of added acid will however be governed by the quantity of acid which may naturally exist in the particular grain being treated.

As lactic acid is expensive to use I then experimented with smaller quantities of stronger acids such as sulphuric acid and I found for example that one part of rice digested with seven parts of water containing ·05 *per cent.* (five hundredths of one *per cent.*) of strong sulphuric acid (S.G. 1840) for one hour at a temperature equal to fifty pounds steam pressure was converted with a result corresponding to that which I obtained by the use of one half of one *per cent.* of lactic acid.

An increase in the amount of acid employed resulted in the developement of excess of sugar attended by a darkening in colour. I do not limit myself to the use of a particular acid or particular acids as acids other than lactic or sulphuric acid may be used for instance a one tenth of one *per cent.* strong hydrochloric acid in place of the aforesaid quantity of sulphuric acid will effect the same result. I prefer not to use much less than the seven parts of water as more acid would then be required to completely convert the starch causing an increase in the production of sugar besides injuring the colour of the product.

In carrying out my improved process according to my present invention I prefer to subject the grain (I will presume it to be rice) to a temperature equal to about fifty pounds steam pressure in conjunction with about seven times its weight of water (containing about ·05 *per cent.* of strong sulphuric acid) for a period of about half an hour terminating the process as soon as the resulting solution shews a reddish-brown colouration on testing a diluted sample with a solution of iodine.

I do not restrict myself to the temperature equivalent to the pressure herein before stated as I can employ a higher pressure in which case the process will be expedited and less acid will be required but for convenience of manipulation I prefer to employ a temperature as hereinbefore stated.

The product obtained according to my present invention when applied to a

heated surface (the solution being preferably previously concentrated) becomes completely dry and can be scraped with great facility from the heated surface and can then be reduced to powder and will then remain dry it not becoming sticky under ordinary atmospheric conditions.

Having obtained a solution from the rice by treatment as hereinbefore described the minute amount of acid in the product can be neutralized which may be done by milk of lime if sulphuric acid has been used or by soda if hydrochloric acid has been used and the whole is then filtered.

The colour of the solution is exceedingly light and therefore the solution does not need to be decolourized by animal charcoal. The filtrate may next be evaporated and the concentrated liquid applied to the surface of a steam heated cylinder from which it can be removed in a dry condition and subsequently finely ground.

If the solution be highly concentrated before applying it to the surface of the steam heated cylinder I may employ sets of rollers or rubbers adjustable to the surface of the cylinder along its length in order to keep the material in a flattened condition of an equal thickness upon the cylinder during the drying. The rollers may be kept cool by means of cold water in order to prevent the material sticking to the rollers.

Spring steel scrapers may be used to bear against the cylinder to scrape off the dried product the spring of the scrapers yielding to any inequalities which there may be upon the surface of the cylinder.

Although I have described the invention more particularly with reference to the production of a material for use in brewing I do not limit myself to the use of the product for that purpose as it may be used for other purposes for instance for stiffening fabrics or in the manufacture of wall papers or for use in the preparation of food for infants. In some of these cases as the complete conversion of the starch is not so important I may add still less acid than the proportion above stated.

If maize or like oily grain be treated it will be well before treatment to get rid of oil therefrom by degerminating or other means.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is :—

1. The treatment of rice or other grain for the production of a material for use in brewing or for other purposes in the manner and under the conditions as regards quantity of water temperature and added acid substantially as herein before explained.

2. In the treatment of rice or other grain for the production of a material suitable for use in brewing or for other purposes subjecting it to a temperature equal to about fifty pounds steam pressure (or a higher temperature) in conjunction with about seven times its weight of water containing about ·05 *per cent.* of sulphuric acid (or its equivalent of other acid) for a period of half an hour or thereabouts substantially as hereinbefore described.

3. The manufacture of a material suitable for use in brewing or for other purposes by treating rice or other grain in the manner and under the conditions as regards quantity of water, temperature, and added acid hereinbefore explained, then neutralizing the acid and filtering and then drying and reducing to powder substantially as hereinbefore described.

Dated this 7th day of December 1893.

J. H. JOHNSON & Co.,
Agents.

London : Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1894